Lasers For Force Protection

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for
Full Dimensional Protection

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The Big Protection Issues

- Countering Weapons of Mass Destruction
- Countering Air and Missile Threats
- Countering Terrorism
- Combat Identification

Elements Of Full Dimensional Protection

Ref: Concept for Future Joint Operations May 1997

1. **Control of the battlespace**
1.1 **Protect from a full range of threats**
1.1.1 Attacks where we are vulnerable
1.1.2 Attacks in our rear areas
1.1.3 Disruption of strategic Comm
1.1.4 Attacks on Host Nation Support
1.1.5 Coercion of partners
1.1.6 Terrorist attacks
2. **Information Superiority**
2.1 **See the battlespace**
2.2 **Discriminate friend and foe**
2.3 **Anticipate and control enemy action**
2.4 **Disseminate threat Information**
2.5 **Protect Information systems**
2.6 **Deny adversary information systems**
3. **Multilayered Protection**
3.1 **Broad range of threats**
3.2 **Full range of offensive and defensive actions**
3.2.1 Joint counter air & missile
3.2.2 Information Operations
3.2.3 Manned and Unmanned Platforms
3.2.4 Sensor grid
3.3 **Passive protection**
3.3.1 Awareness of threat
3.3.2 Enhance Deception and Camouflage
3.3.3 Increased personal protection
3.3.4 Dispersed operations
3.3.5 Improved electronic countermeasures
3.3.6 Joint restoration from WMD
3.3.7 New sensors to detect WMD
3.4 **Offensive and Defensive actions**
3.4.1 Active and passive protection
3.4.2 ID and track friendly vulnerabilities
3.4.3 Discriminate friend and foe
3.4.4 Safety and health initiatives

Advantages of LASERS

- Power
- Speed of Light
- Coherence
- Short Wavelength
  - LWIR to X-RAY
- Wavelength Selectability
- Modulation Options
  - Time Domain, Frequency Domain, Phase, Polarization
  - High Bandwidth
- Detector Options
  - Imaging, Modulation Specific
- Compact

Example Applications Weapons

- Theater High Energy Laser (THEL)
- Airborne Laser

X	Power
X	Speed of Light
	Coherence
	Short Wavelength
	Wavelength Selectability
	Modulation Options
	High Bandwith
	Detector Options
	Compact

Example Applications Sensors for Counter WMD

- Detect Gas, Aerosol or Particulate Clouds
- Identify Chemicals or Biologicals

	Power
	Speed of Light
	Coherence
X	Short Wavelength
X	Wavelength Selectability
X	Modulation Options
X	High Bandwith
X	Detector Options
X	Compact

Example Applications
Combat ID

•Precision Targeting Identification (PTI)

	Power
	Speed of Light
X	Coherence
	Short Wavelength
	Wavelength Selectability
X	Modulation Options
X	High Bandwith
X	Detector Options
X	Compact

Lasers In ACTDs

(ACTD Web Site www.acq.osd.mil/at)

- Theater High Energy LASER (THEL ACTD)
  - Destroy Katyusha Style Rockets
- Precision Targeting Identification (PTI ACTD)
  - Micro Doppler Signatures
  - Precision Track
- Unattended Ground Sensors (UGS ACTD)
  - Ceilometer to Measure Cloud Height
- Rapid Force Protection Initiative (RFPI ACTD)
  - Forward Observer/Forward Air Control (FO/FAC)
  - Hunter Sensor Suite (Range Measurement)
  - Remote Sentry (Range Measurement)
- Military Operations in Urban Terrain (MOUT ACTD)
  - Forward Observer/Forward Air Control (FO/FAC)

Precision Targeting Identification (PTI)
FY98 ACTD

MISSION:

- Detect, Track, Identify Non-Cooperative Air, Land and Sea Targets
- Demonstrate Capability Aboard JIATFE Counter Drug P-3 aircraft

PERFORMANCE Requirement:

- Detect, Track, and ID
  - Aircraft to 35 NM, Ships to 30 NM, Ground Targets to 12 NM Passively
- Day/night Operations Vs. Small, Fast, Non-Metallic Hulled Vessels

TECHNOLOGIES:

- 3RD Gen MWIR Staring FLIR with a 4X Increase in Range
- Navy Developed Stand Off Electro-optical System
- Infrared LADAR system
  - Precise 3D Track
  - Non-Cooperative Target Identification (Vibration Signature Analysis)
  - Developed under Navy Combat ID Sponsored 6.3 Program
  - Shipboard and Airborne Sensor Packages Developed Under USN Radiant Mist and Outlaw Programs

Unattended Ground Sensor
FY 98 ACTD

- **Unattended MASINT Sensors**
  - Find and Identify Time Critical Targets
- **Remote Miniature Weather Station (RMWS)**
  - USSOCOM Requirement
  - Local "NOW" Weather (Temperature, Wind, Visibility, etc)
  - Ceiling Height Requirements
    - +/- 10 ft below 1500 ft and +/-100 ft above to 12000ft
    - Air Deployable (3000Gs impact)
    - All Weather operation
    - Satellite Readout
  - Ceilometer Design
    - LASER Trans: 16mm Aperture, 20mJ-5ns Pulses, 1.06 μm Freq
    - Laser Receiver: 50 mm Aperture
    - Total System weight 14 lb.

Some Needs

- See Through Obscurants: Fog, Smoke
  - Range Gating
- Recognize Man Made Objects
  - Polarization
- Identify Objects
  - Range Profiles, Other
- Auto Land in Category 3 Weather and Obscurants
  - Forward Scatter
- Penetrate Foliage and Camouflage
  - Exploit Multiple Small Openings
- See and Communicate Inside of Buildings
  - ?
- Sterilize Chemicals or Biologicals
  - Speculative !

Some Requirements

- Cost Effective
  - 80% solutions
- Safe
- Rugged
- Minimal Skills Required for Operation
- Maintainable
- If Man Portable
  - Small
  - Simple
  - Light Weight
  - Low Power Needs
  - Low Signature